



PC Builder

If you've ever fancied building your own computer but didn't know how, this guide is just what you need. Just use **Alex Watson's** easy-to-follow PC-building masterclass and you'll have a working PC in no time

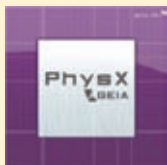


FASTER PHYSICS IN THE PIPELINE

The recent Electronic Entertainment Expo (E3) in Los Angeles was a galling experience for devoted PC gamers, as it was dominated by next-generation console technology in the form of the Xbox 360 and the PlayStation 3. However, there were a few products of interest, including some good-looking new games, and nVidia and ATI both had new products, although they were kept firmly under lock and key.

Most interesting of all was the latest information on the PhysX Physics Processing Unit. Developed by a new company called Ageia, it claims to do for game physics what dedicated accelerator boards do for 3D graphics, speeding up games by taking work away from the processor.

Asus revealed that it will produce add-in boards that use the PhysX chip, and a small but select range of games developers including Atari, Shiny and Ubisoft announced plans to implement support for the chip in several new games. To see the full list of developers and game titles that were announced at the show, visit Ageia's website at www.ageia.com.



A surprising number of people believe that building a PC requires a PhD, but this isn't the case. Don't let the transistors, capacitors and gleaming circuit traces scare you: motherboards and graphics cards might be hugely advanced pieces of technology, but they're designed to be easy to piece together.

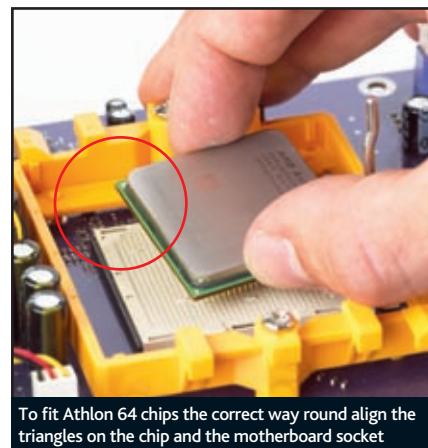
You probably have an idea of the components you want inside your PC, but there are two areas that most PC builders skip over too quickly: the case and the power supply unit (PSU). The worst way of choosing a case is to opt for the cheapest or best looking, or simply to pick one at random. When looking for a case, make sure it has enough room for your components and adequate cooling. Look for a case with 120mm fans as these spin more slowly while shifting more air, resulting in a quieter computer. You should also look at our *Labs* test of 18 cases on page 195.

While some cases come with power supplies, these can be cheap and nasty and some lack SATA and PCI-E connectors. Invest in a PSU that will prove reliable and provide plenty of headroom for upgrading. Antec, Tagan and Hiper have good reputations for reliability, and all sell units that are rated at around the 500W mark, which will provide plenty of muscle for a high-power PC.

Finally, head to your local branch of Maplin and buy an anti-static strap. This goes round your wrist and plugs into a mains socket, earthing you so that you don't zap your new PC bits with an unhealthy dose of static electricity.

1 Once you have all the kit, it's a good idea to build a portion of your PC outside the case. This enables you to make sure the components aren't dead on arrival and stops you getting caught out by your processor cooler, some of which need to be screwed into both sides of the motherboard.

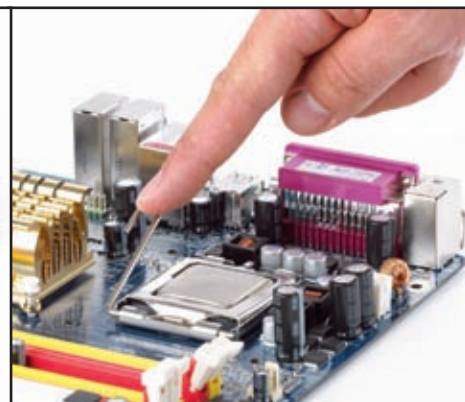
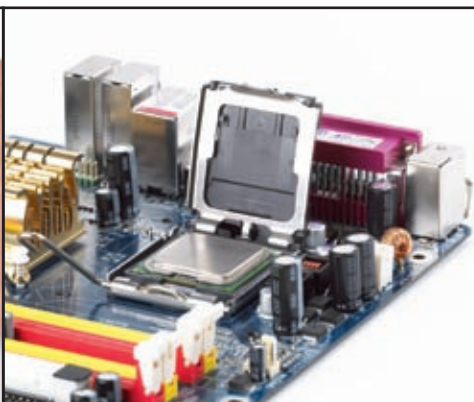
As the pins for modern Pentium 4 processors are on the motherboard itself, inserting the chip is



To fit Athlon 64 chips the correct way round align the triangles on the chip and the motherboard socket

easy. Simply release the lever, flip up the socket cover, align the notches on the processor with the socket and gently place it on the pins. Lower the frame and the lever locks it in place. Athlon 64 motherboards are more traditional: the pins are on the bottom of the processor, and the processor has a small gold arrow on one corner to help you align it with the socket. Unlock the socket by flicking up the plastic lever and place the processor on the socket so that the pins sink in fully. Use the lever to lock it in place.

2 For the processor heat sink to work with maximum efficiency it must make good contact with the processor. Even though they might look it, the top of the processor and the bottom of the heat sink are never completely smooth, so thermal interface material (TIM) is used to fill in these flaws. Most heat sinks come with a small tube of TIM, but you can also buy it from websites such as Overclock (www.overclock.co.uk). Use half a business card to spread a very thin layer of TIM over the surface of the processor.



To fit a Socket 775 Pentium 4 release the clamp and cover, then place the chip on the bed of pins, guided by the notches on either side of the chip, before recovering and clamping



3 Most heat sinks attach using a standard mounting method. In the case of Intel processors, this is four fiddly push-pins. For Athlon 64s a clamp attaches to three prongs on either side of a plastic retention frame on the motherboard. Some high-power processor coolers such as the Asus Star Ice must be screwed into both sides of the motherboard.

4 Once the heat sink is installed, don't forget to plug the fan into the fan header. Many motherboards can control the processor fan for optimum cooling and low noise, but the fan must be plugged into the right header for this to happen. It should be labelled 'CPU FAN' or something similar.

5 When you have mounted the processor and heat sink, insert the RAM into the DIMM slots. If you have two sticks of RAM, check the motherboard manual to see which two slots can work together in dual-channel mode.

6 Now is a good time to connect the PSU. There will probably be two power connectors on the motherboard. One, a long 20- or 24-pin socket, is usually found on one of the motherboard's edges. There's also a four-pin socket that's usually found near the processor.

7 If you have a SATA hard disk, attaching it is simply a matter of cabling it to a free SATA connection on the motherboard. If you have a PATA drive, rounded IDE cables are a good idea as they are easier to work with and they don't obstruct the airflow inside the case. Each IDE cable can support two drives: the first drive you add

REVIEW COOLER

ARCTIC COOLING Freezer 7

RATING ★★★★★

PRICE £20 inc VAT

SUPPLIER www.overclock.co.uk

DETAILS www.arctic-cooling.com

There are several areas that PC builders typically overlook when building their own PC. A lousy cooler can result in a PC that's frustrating to build, noisy when running and hopelessly unreliable. While not the worst around, the standard Pentium 4 heat sink is fiddly to attach and noisy at high speeds, which is unfortunate, because the latest Pentium 4 processors produce lots of heat.

Although it looks ungainly, it's a superb and very cheap replacement for the Intel stock heat sink. The copper base and heat pipes are excellent at whipping heat away from the processor. Despite resembling an outboard motor, the Freezer 7's low-speed fan makes a pleasant hum.

As well as being a lot quieter than the reference heat sink, it's also more efficient, because



it offers better cooling. The Freezer 7 is also easy to fit, as its compact base allows easy access to the push-pins that clamp it to the motherboard. Don't despair if you have an Athlon 64, either, as there's an AMD-compatible version. The Freezer 64 has a different mounting mechanism to cope with Socket 754/939/940 motherboards.

must be configured as a master drive and the second one must be configured as a slave. Do this using a small plastic jumper to bridge metal pins on the drive. Instructions will be printed on the drive detailing where to position the jumper to make it a master or a slave, and you'll need to use a pair of tweezers. It's best to attach the master to the end connector of the cable and the slave to the middle

connector. Remember that each drive will need a power plug.

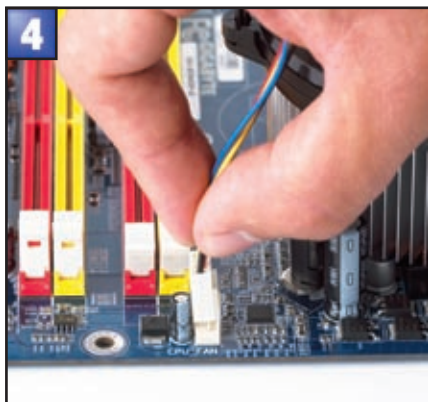
8 Finally, add the graphics card. If you've never built a PC before, you may be surprised by the amount of force this requires. This doesn't give you carte blanche to use a hammer. However, the gold connectors on the



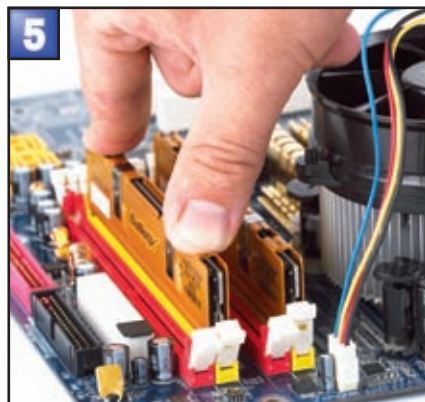
Apply the thermal interface material and spread it evenly over the top of the processor using a bit of card



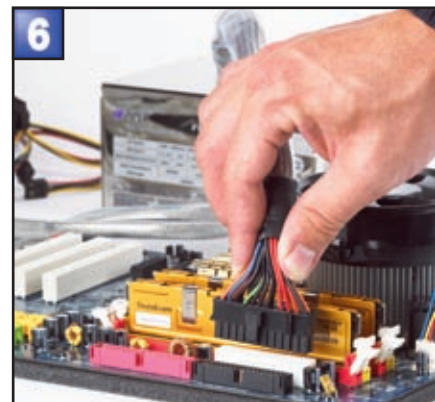
Push pins secure the clips that attach the CPU cooler



Make sure you attach the fan to the CPU FAN header



Use paired sockets for a dual-channel memory setup



Don't forget the motherboard power connector



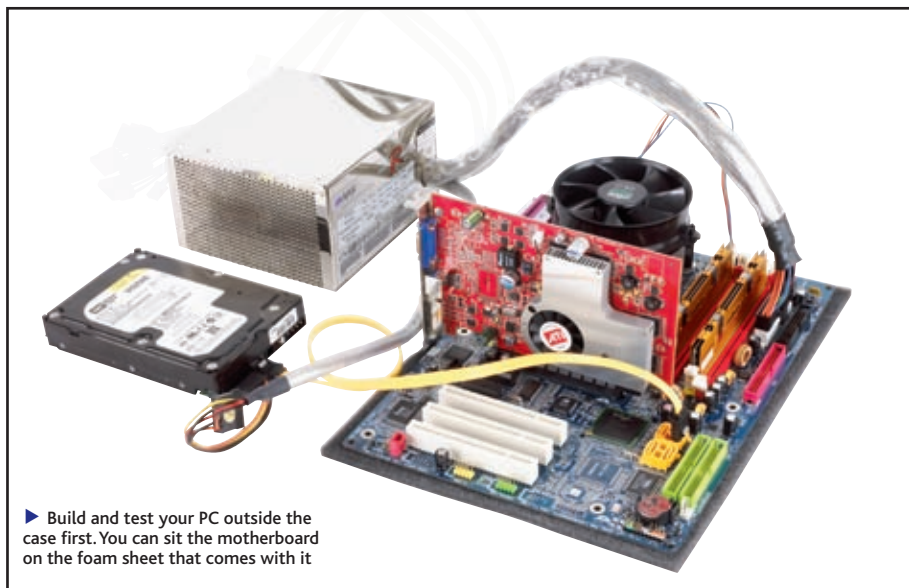
edge of the card should be pushed fully into the AGP or PCI-E slot. Make sure you plug a power connector into the card if it needs one.

9 Plug in your mouse, keyboard and monitor, and try to start the PC. Take a screwdriver and use it to connect the two pins on the motherboard labelled 'PWR_ON.' To find these, check the motherboard manual and look for the 'front panel header' diagram. The computer should come to life. If this doesn't happen, see which component isn't doing anything. Does the fan in the PSU turn? Do the LEDs on the motherboard come on? This should help you locate any problems, but remember to turn off all the power before you check the connections.

10 If all goes well, enter the BIOS by pressing the Del key and check that the motherboard detects the hard disk. Turn the power off, disconnect the mouse, keyboard, monitor, hard disk and PSU and remove the graphics card. The PSU is the first item to install in the case. Place it into the correct slot at the top of the case, screw it in and keep the cables out of the way until they're needed.

11 It's now time to transfer the motherboard to its new home. You must use standoffs to fix the motherboard clear of the case. These are either small, hexagonal brass stands or silver metal clips. The brass stands are screwed in using a pair of pliers, and the silver clips are pressed in with your fingertips.

Screw the motherboard in so that it's secure, then connect the power leads. Try to route these neatly around the case's internal features – it may even be worth tucking some behind the



motherboard. Buy a bag of cable ties and some plastic cable wrap from Overclock (www.overclock.co.uk). These will help to keep your PC neat and tidy, and the cable wrap also makes the power leads much easier to manoeuvre.

Then add the drives, graphics cards and other plug-in boards. Pay attention to the wiring: the neater it is, the better the airflow will be and the more efficient the cooling.

12 Finally, connect the case's switches and LEDs to the front header panel on the motherboard. Turn the PC on again; it should leap into life. Head into the BIOS and set the CD drive to be the primary boot drive. Insert a

Windows XP installation disc into the drive, save the changes to the BIOS and reboot. When the moment comes, press any key to boot from the CD, and the Windows installer will start. When Windows has finished, don't forget to install your motherboard's chipset driver first, followed by DirectX and all the other relevant drivers.

Congratulations, you are now a PC builder!

NEXT MONTH

BUILD A MEDIA CENTRE

The black art of DIY Windows Media Center Edition systems revealed

